Database Description
for

ShakeCast

"ShakeCast: Delivering Earthquake Shaking Data to the People Who Need It"

Software Version 1.0
Documentation Version 1.0

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Chapter 1 Introduction

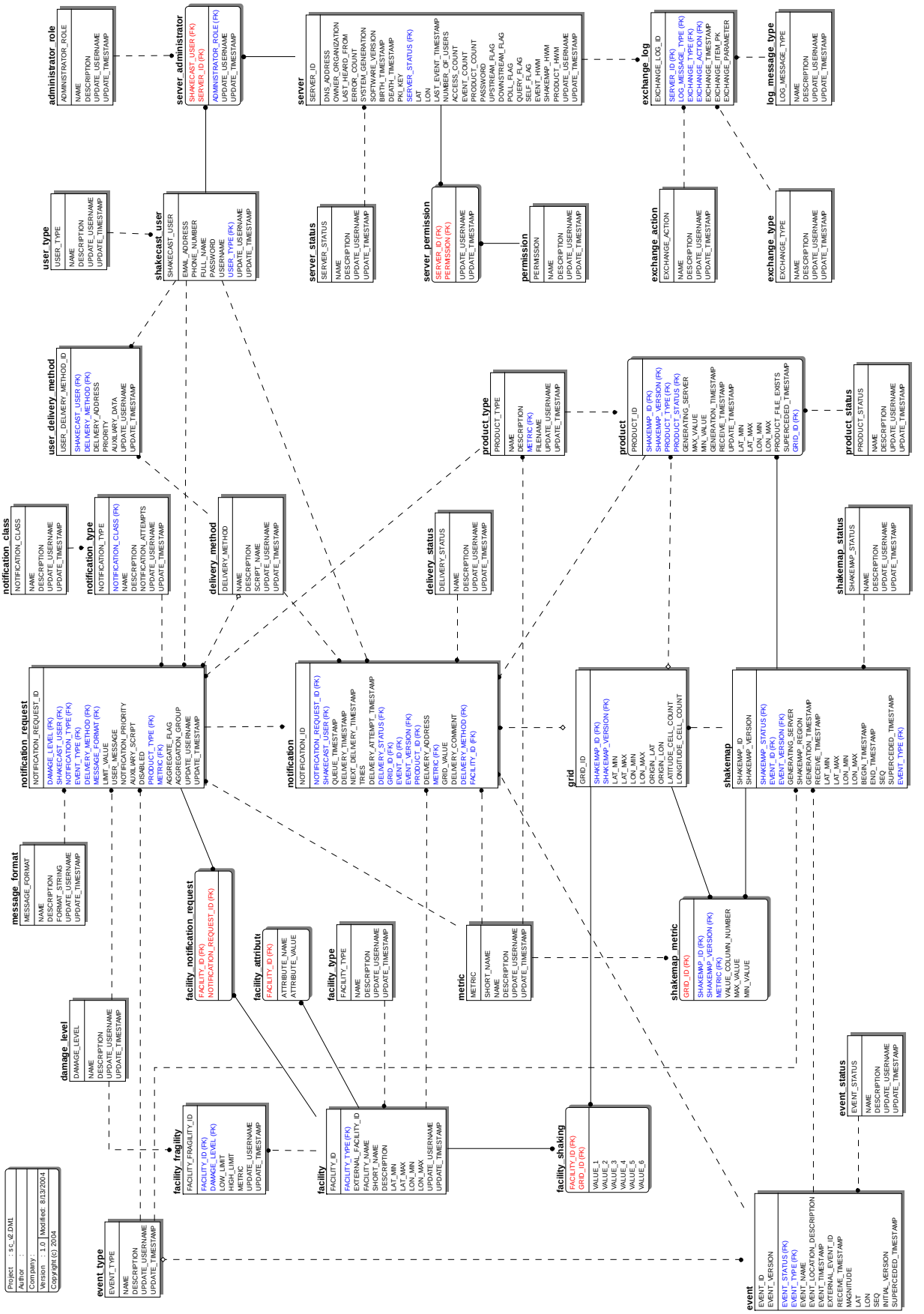
ShakeCast servers store much of the data used by the server in a relational database. The ShakeCast database contains information needed to interact with other ShakeCast Servers, data that will be presented to users, configuration information needed to perform notifications, and various other kinds of data.

The following paragraphs document the structure of the ShakeCast database using a standard entity-relationship modeling syntax.

The ShakeCast database is used in all elements of the ShakeCast system. Although some tables are used in many different stages of ShakeCast operation, the tables may be conveniently grouped as follows:

- Tables that define the ShakeCast system, the network of ShakeCast servers, exchanges between those servers, and the administrators who maintain that network
- Tables that define ShakeCast events (earthquakes), products, and related data
- Tables that are used to notify end users of earthquakes, shaking levels at particular facilities, and other ShakeCast events
- Miscellaneous operational tables

Each of these groups of tables is documented in the sections below.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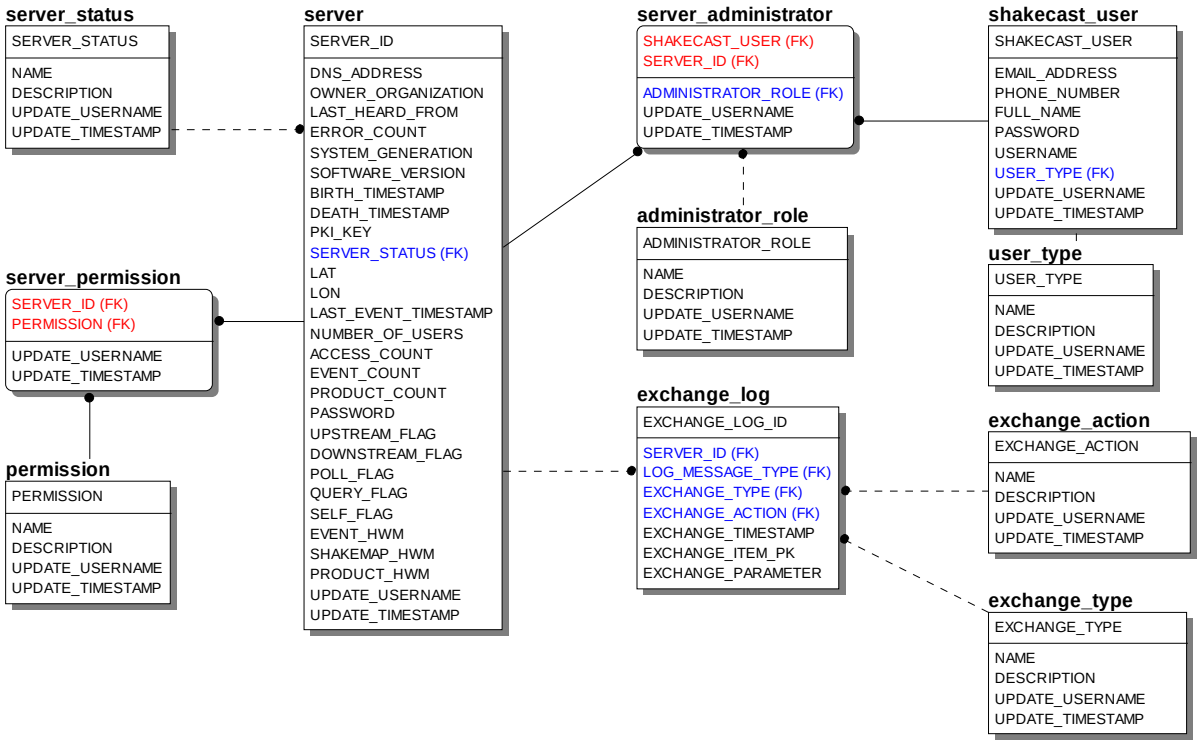
Chapter 2 Database Tables for Servers and System Administrators

The first group of tables defines ShakeCast servers and the organizations and users responsible for those servers. These tables also define the rights that each server has to communicate with the current server.

Server Tables



2.1 SERVER

The SERVER table contains information about every ShakeCast server that this server communicates with and every server that creates data used by this server.

Column	Datatype	Description
SERVER_ID	Integer	A globally unique identifier for the server. Server IDs are currently assigned by contacting the ShakeCast Registrar, at register@shakecast.org .
ACCESS_COUNT	Integer	The number of user accesses to ShakeCast data and reports. (Not currently used.)
BIRTH_TIMESTAMP	Datetime	The earliest known date of operation of the server. (Not currently used.)
DEATH_TIMESTAMP	Datetime	The last known date of operation of the server. (Not currently used.)
DNS_ADDRESS	String	DNS address (name) of the server. This may also be the IP address, if necessary.
DOWNSTREAM_FLAG	Integer	This value is non-null if the server is downstream of this server; that is, if the local server feeds data to the server defined in this record of the SERVERS table.
ERROR_COUNT	Integer	The number of errors recorded since the last time a successful exchange took place with this server. (Not currently used.)
EVENT_COUNT	Integer	The number of ShakeCast events stored in the ShakeCast server.
EVENT_HWM	Integer	The latest (greatest) EVENT.SEQ sent to the server listed in this record.
LAST_EVENT_TS	Datetime	The date and time of the last update to the event table on this server.
LAST_HEARD_FROM	Datetime	The date and time (GMT) that the server was last heard from by this server
LAT	Float	Latitude of this server
LON	Float	Longitude of this server
NUMBER_OF_USERS	Integer	The number of unique user IDs that have access to ShakeCast data. (Not currently used.)
OWNER_ORGANIZATION	String	The name of the organization that operates this server
PASSWORD	String	The password used by the local server to log into this remote server.
PKI _KEY	String	The public key associated with this server. (Not currently used.)
POLL_FLAG	Integer	This value is non-null if the given server should be polled by the local server. (See also

		QUERY_FLAG.)
PRODUCT_COUNT	Integer	The number of ShakeCast products stored in the ShakeCast server. (Not currently used.)
PRODUCT_HWM	Integer	The latest (greatest) PROCUCT.PRODUCT_ID sent to the server listed in this record.
QUERY_FLAG	Integer	This value is non-null if the given server should be allowed to poll the local server. (See also POLL_FLAG.)
SELF_FLAG	Integer	This value is non-null if the record refers to the local server. This is how the local server stores and locates its server characteristics. Only one record may have the SELF_FLAG set.
SHAKEMAP_HWM	Integer	The latest (greatest) SHAKEMAP.SEQ sent to the server listed in this record.
SOFTWARE_VERSION	String	The version string for the ShakeCast software this server is currently running.
STATUS	Integer	The current operational status of the server
SYSTEM_GENERATION	Integer	The number of times that this server has restarted the ShakeCast software. This value is incremented each time a server is restarted.
UPDATE_TIMESTAMP	Date	Last time this record was changed.
UPDATE_USERNAME	String	Local database user who performed the last update.
UPSTREAM_FLAG	Integer	This value is non-null if the server is upstream of this server; that is, if the local server feeds data to the server defined in this record of the SERVERS table.

2.2 SERVER_STATUS

The SERVER_STATUS table defines the valid codes for the STATUS column of the SERVER table. Typical values for the SERVER_STATUS column include “ALIVE”, “UNKNOWN”, and “REMOVED”.

Column	Datatype	Description
SERVER_STATUS	String	Type code for server status
NAME	String	Status name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.3 SERVER_PERMISSION

The SERVER_PERMISSION table defines the valid codes for the PERMISSION column of the SERVER table. (This table is not currently used.)

Column	Datatype	Description
SERVER_ID	Integer	ID of the server for which permission is to be established.
PERMISSION	Integer	Code for the permission granted to this server.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.4 PERMISSION

The PERMISSION table defines which activities are valid when communicating with the each server in the ShakeCast network. (This table is not currently used.)

Column	Datatype	Description
PERMISSION	Integer	Type code for operations permitted in interactions between the local server and the server indicated.
NAME	String	Status name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.5 SERVER_ADMINISTRATOR

The SERVER_ADMINISTRATOR table contains links to the ShakeCast users who administer ShakeCast servers. In most cases, a particular individual will be associated with only a single ShakeCast server. (This table is not currently used.)

Column	Datatype	Description
SERVER_ID	Integer	The globally unique ID for the server with which this administrator is associated.
SHAKECAST_USER	String	The user ID of the ShakeCast user who is an administrator for this server.
ADMINISTRATOR_ROLE	Integer	The role that this person serves in the administration of this server.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.6 ADMINISTRATOR_ROLE

The ADMINISTRATOR_ROLE table defines the valid roles for administrators. (This table is not currently used.)

Column	Datatype	Description
ADMNISTRATOR_ROLE	Integer	Type code for the administrator role
NAME	String	Name of role
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.7 EXCHANGE_LOG

A product is moved between ShakeCast servers via an *exchange*. The EXCHANGE_LOG table records salient information about this activity. (This table is not currently used.)

Column	Datatype	Description
EXCHANGE_LOG_ID	Integer	Locally unique identifier for each exchange operation
SERVER_ID	Integer	Globally unique ID of the server on the other end of the exchange. Foreign key to the SERVER table.
EXCHANGE_TYPE	String	Type of exchange activity. Foreign key to the EXCHANGE_TYPE table
EXCHANGE_ACTION	String	The action taken during this exchange. Foreign key to the EXCHANGE_ACTION table.
EXCHANGE_TIMESTAMP	Datetime	The date and time the exchange was initiated
EXCHANGE_ITEM_PK	Integer	A general parameter to hold the primary key value of the item exchanged. The interpretation of this value depends on the EXCHANGE_TYPE.
EXCHANGE_PARAMETER	String	A general parameter to contain additional data about the exchange. The interpretation of this column depends on the value of EXCHANGE_TYPE.

2.8 EXCHANGE_TYPE

The EXCHANGE_TYPE table defines the valid codes for the EXCHANGE_TYPE column of the EXCHANGE table. Valid exchange types include “Get”, “Put”, and “Heartbeat”.

Column	Datatype	Description
EXCHANGE_TYPE	String	Type code for exchanges
NAME	String	Exchange type name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.9 EXCHANGE_ACTION

The EXCHANGE_ACTION table defines the disposition of the exchange. (This table is not currently used.)

Column	Datatype	Description
EXCHANGE_TYPE	Integer	Type code for exchanges
NAME	String	Exchange type name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

2.10 LOG_MESSAGE_TYPE

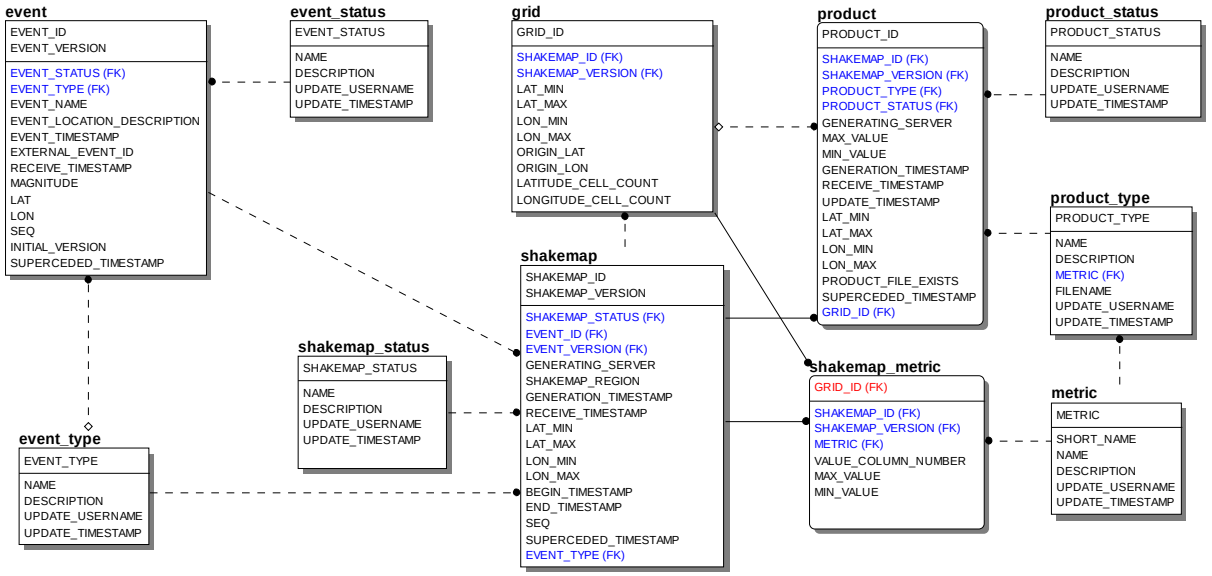
The LOG_MESSAGE_TYPE table defines the type of record stored in the ECHANGE_LOG table. (This table is not currently used.)

Column	Datatype	Description
LOG_MESSAGE_TYPE	Integer	Type code for log records.
NAME	String	Exchange type name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

Chapter 3 Database Tables for Events, ShakeMaps, and Products

The following tables contain the data needed to represent Events, ShakeMaps, and ShakeMap Products.

Events, ShakeMaps and Products



3.1 EVENT

The EVENT table contains information about seismic events. The EVENT_ID is a globally unique, permanently assigned identifier associated with a single seismic event.

Column	Datatype	Description
EVENT_ID	Integer	A globally unique identifier for the event
EVENT_LOCATION_DESCRIPTION	String	Human-readable location description (i.e., “8.1mi of

		Pasadena, CA")
EVENT_NAME	String	Name of event (i.e., "Northridge")
EVENT_STATUS	Integer	The status of this event (active, cancelled, test, archive, etc.)
EVENT_TIMESTAMP	Datetime	The date and time (GMT) that the event occurred
EVENT_TYPE	Integer	Foreign key to the EVENT_TYPE table
EVENT_VERSION	Integer	A sequential version number. The latest version is the most current representation of the data about this event.
EXTERNAL_EVENT_ID	String	Event ID in a locally-defined external server
LAT	Float	The latitude of the point representation of the event
LON	Float	The longitude of the point representation of the event
RECEIVE_TIMESTAMP	Datetime	The time this event information was first received on this server
SUPERCEDED_TIMESTAMP	Datetime	The time this event was superceded by a newer version or by a different event.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.2 EVENT_STATUS

The EVENT_STATUS table defines the valid codes for the STATUS column of the EVENT table. The event status is typically one of the following: "normal", "cancelled", "incomplete", or "released".

Column	Datatype	Description
EVENT_STATUS	String	Type code for event status
NAME	String	Status name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.3 EVENT_TYPE

The EVENT_TYPE table defines the valid codes for the EVENT_TYPE column of the EVENT table. The event type is typically one of the following: "actual", "test", or "scenario".

Column	Datatype	Description
EVENT_TYPE	Integer	Code for the event type
NAME	String	Event type name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.4 SHAKEMAP

The SHAKEMAP table describes a single ShakeMap. A ShakeMap is produced outside of the ShakeCast system, by a ShakeMap Server. ShakeMaps are associated with zero or more events and with zero or more Products.

Column	Datatype	Description
SHAKEMAP_ID	Integer	Uniquely defines a ShakeMap.
SHAKEMAP_VERSION	Integer	ShakeMap versions start with one and are increased each time the ShakeMap is updated. Only the latest version of a ShakeMap is correct. The primary key of this table is the SHAKEMAP_ID plus VERSION.
EVENT_ID	Integer	The EVENT_ID and EVENT_VERSION of the event for which this ShakeMap was created.
EVENT_VERSION	Integer	
GENERATION_TIMESTAMP	Datetime	The time this ShakeMap was first created
GENERATING_SERVER	Integer	The unique ID of a ShakeCast server
GRID_ID	Integer	Foreign key to the Grid Table, which defines the bounding box and cell size of the grid that applies to this ShakeMap
BEGIN_TIMESTAMP	Datetime	The beginning date and time of the period covered by this ShakeMap. (Not currently used.)
END_TIMESTAMP	Datetime	The ending date and time of the period covered by this ShakeMap. (Not currently used.)
LAT_MIN	Float	Bounding box of the area covered by this ShakeMap
LAT_MAX	Float	
LON_MIN	Float	
LON_MAX	Float	
RECEIVE_TIMESTAMP	Datetime	The timestamp of the last time this ShakeMap was received from an upstream server

SEQ	Integer	The unique local sequence number of this event on this server. This sequence number is used to keep track of the high water mark for event records.
SHAKEMAP_REGION	String	The ShakeMap region that generated this ShakeMap. (Not currently used.)
SHAKEMAP_STATUS	Integer	The status of this ShakeMap (active, cancelled, test, archive, etc.)
SUPERCEDED_TIMESTAMP	Datetime	Time this ShakeMap was superceded by a new version or by a different ShakeMap.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.5 SHAKEMAP_STATUS

The SHAKEMAP_STATUS table defines the valid codes for the STATUS column of the SHAKEMAP table. The ShakeMap status is typically one of the following: “normal”, “cancelled”, “incomplete”, “released”, and “reviewed”.

Column	Datatype	Description
SHAKEMAP_STATUS	String	Type code for ShakeMap status
NAME	String	Status name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.6 SHAKEMAP_REGION

The SHAKEMAP_REGION table defines the ShakeMap Regions. Regions might include Southern California, Northern California, and Utah. (This table is not currently used.)

Column	Datatype	Description
SHAKEMAP_REGION	String	Type code for ShakeMap Region
NAME	String	Region Name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.7 PRODUCT

This table contains information about each ShakeMap product. A product is a single metric (PRODUCT_METRIC column) for a single ShakeMap (SHAKEMAP_ID column) in a single format (PRODUCT_FORMAT column).

Column	Datatype	Description
PRODUCT_ID	Integer	A globally unique identifier for this product.
GENERATING_SERVER	Integer	The unique ID of a ShakeCast server
GENERATION_TIMESTAMP	Datetime	The time this ShakeMap was first created.
GRID_ID	Integer	A foreign key to the grid layout that is used when this data is represented relationally
LAT_MAX	Float	Bounding box of the area covered by this product
LAT_MIN	Float	
LON_MAX	Float	
LON_MIN	Float	
MAX_VALUE	Integer	The maximum value for METRIC contained within this product.
METRIC	Integer	The shaking metric represented in this product, such as “acceleration”, “instrumental intensity”, etc.
MIN_VALUE	Integer	The minimum value for METRIC contained within this product.
PRODUCT_FILE_EXISTS	Integer	A flag that indicates that the file has been successfully transferred to this server. (The product record may exist before the product is actually available on this server.)
PRODUCT_TYPE	Integer	The type of this product, e.g., “GRID”, “HAZUS”, “CONT_PGA”, “INTEN_JPG”, etc.
PRODUCT_STATUS	Integer	The status of this product (active, cancelled, test, archive, etc.)
RECEIVE_TIMESTAMP	Datetime	The time this product information was first received on this server
SHAKEMAP_ID	Integer	The ID and VERSION of the ShakeMap associated with this product.
SHAKEMAP_VERSION	Integer	
SOURCE_FILENAME	String	The name of the file in the local filesystem that contains this product. This may be a single file, a directory name, or the name of an archive file containing multiple files (e.g., a ZIP file)
SUPERCEDED_BY	Integer	The PRODUCT_ID of a product that supercedes this one.
SUPERCEDES	Integer	The PRODUCT_ID of a product that this product supercedes. If this product supercedes more than one product,

		only one is listed here.
UPDATE_TIMESTAMP	Datetime	The last time this table or the ShakeMap itself was updated.
VERSION	Integer	Product versions start with one and are increased each time the product is updated. Only the latest version of a product is valid and correct. The primary key of this table is the PRODUCT_ID plus VERSION.

3.8 PRODUCT_STATUS

The PRODUCT_STATUS table defines the valid codes for the STATUS column of the PRODUCT table. The product status is typically one of the following: “released”, “reviewed”, and “cancelled”.

Column	Datatype	Description
PRODUCT_STATUS	String	Type code for product status
NAME	String	Status name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.9 METRIC

The METRIC table defines the valid codes for the METRIC column of the PRODUCT table. Shaking metrics include “peak spectral acceleration”, “maximum velocity”, “instrumental intensity”, and so on.

Column	Datatype	Description
METRIC_ID	Integer	Unique identifier for this metric.
NAME	String	Product type name
SHORT_NAME	String	Abbreviation for metric name
DESCRIPTION	String	Human readable meaning of this metric
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.10 PRODUCT_TYPE

The PRODUCT_TYPE table defines the valid codes for the PRODUCT_FORMAT column of the PRODUCT table. Product Types describe both the data in a product (e.g., "TV Map") and the file format (e.g., ".zip" or ".jpg"). For example, the PRODUCT_TYPE might include "CONT_PGA" for shapefile contours of PGA, "CONT_PGV" for shapefile contours of PGV, GRID for a ShakeMap grid file, HAZUS for a HAZUS-format file, "INTEN_JPG" for a Shaking Intensity JPG image and "INTEN_PS" for a ShakeMap Intensity PostScript image file.

Column	Datatype	Description
PRODUCT_TYPE	Integer	Format code for products
NAME	String	Product format name
DESCRIPTION	String	Human readable meaning for this value
FILENAME	String	The string used to construct the filename for this product type. This information is concatenated with the short name of the metric to construct a full filename to store the product.
METRIC_ID	Integer	Foreign key to the Metric table. Defines the metric contained in this Product Type. Not all Product Types have a metric (e.g., GRID_XYZ products contain a mix of products).
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

3.11 GRID

A ShakeMap Grid is a rectangular array of cells, each of fixed size (in terms of latitude and longitude). The GRID table describes this array.

Column	Datatype	Description
GRID_ID	Integer	Unique ID for this grid.
ORIGIN_LATITUDE	Float	Latitude of the origin of the grid
ORIGIN_LONGITUDE	Float	Longitude of the origin of the grid
LATITUDE_CELL_COUNT	Integer	Number of cells in the direction of latitude (north-south).
LONGITUDE_CELL_COUNT	Integer	Number of cells in the direction of longitude (east-west)
LAT_MIN	Float	Bounding box of the area covered by this product
LAT_MAX	Float	
LON_MIN	Float	
LON_MAX	Float	

3.12 FACILITY_SHAKING

This table contains the maximal values for each of up to six metrics associated with a particular facility and a particular grid. That is, these are the "maximal shaking values" for this facility associated with this grid. Since a grid is a particular representation of a ShakeMap, the FACILITY_SHAKING table can be thought of as the shaking values at a particular facility associated with a particular ShakeMap.

Column	Datatype	Description
FACILITY_ID	Integer	Foreign key to the FACILITY table. Defines the facility for which these values apply.
GRID_ID	Integer	Foreign key to the Grid Table. Defines the GRID, and indirectly the ShakeMap, for which these values apply.
VALUE_1	Float	The values for this grid cell for each metric generated by this ShakeMap are stored in these columns. The VALUE_COLUMN_NAME table SHAKEMAP_METRIC defines which column contains a particular metric. Additional columns may be added in the future. No assumption should be made about the order in which metrics appear in these columns.
VALUE_2	Float	
VALUE_3	Float	
VALUE_4	Float	
VALUE_5	Float	
VALUE_6	Float	

3.13 SHAKEMAP_METRIC

This table defines the metrics that are available from a particular ShakeMap. It also defines which column in the FACILITY_SHAKING table contains the values for a particular metric for this ShakeMap. Software can examine the SHAKEMAP_METRIC table to find the maximal values for any particular metric for any particular ShakeMap (and, by extension, for any particular event). Alternately, software can examine the table to find all of the maximal values for all metrics for a particular ShakeMap, or for a particular metric.

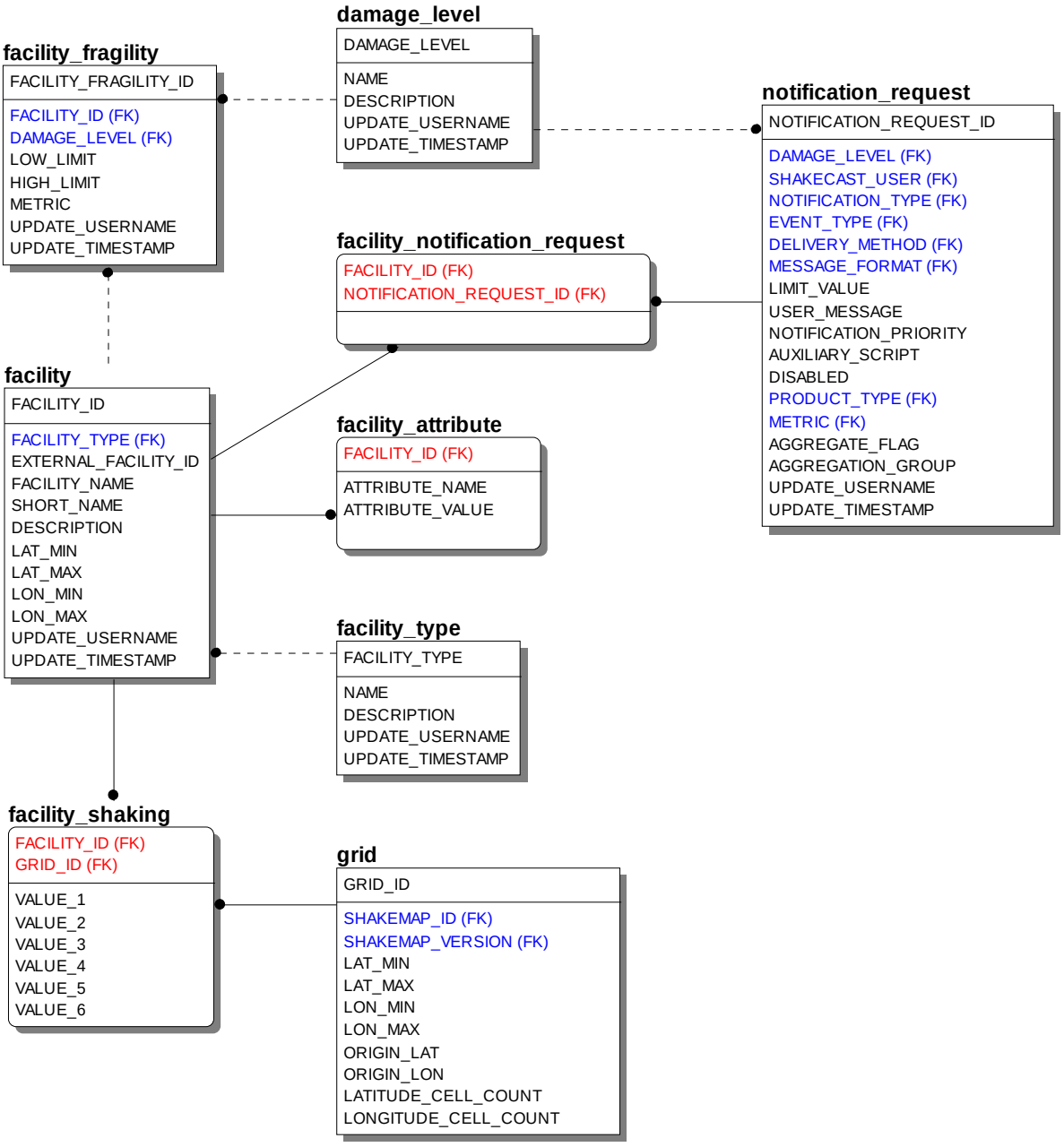
Column	Datatype	Description
SHAKEMAP_ID	Integer	Foreign key to the ShakeMap Table. Defines the ShakeMap for which this Grid Value applies.
SHAKEMAP_VERSION	Integer	
METRIC_ID	Integer	Foreign key to the Metric Table
VALUE_COLUMN_NUMBER	Integer	The VALUE_x column number (i.e., VALUE_1, VALUE_2) in the FACILITY_SHAKING table that contains this metric for this ShakeMap.
MIN_VALUE	Float	The minimum value of this metric in this ShakeMap (not including possible null values).

MAX_VALUE	Float	The maximum value of this metric in this ShakeMap (not including possible null values).
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

Chapter 4 Database Tables for Facilities

The ShakeCast System uses the following tables to define facilities and their attributes.

Facilities



4.1 FACILITY

A ShakeCast Facility is a specific structure (e.g., bridge, school, pumping station, etc.) at a specific location or a region. The location may be defined by a latitude/longitude for "point" facilities, or by a bounding box for non-point facilities. Note that the FACILITY table may be used to define a physical facility (e.g., a freeway overpass) or a region (e.g., a county). However,

when used to specify a region, the FACILITY table must express the region as a rectangular bounding box.

Column	Datatype	Description
FACILITY_ID	Integer	A locally-unique primary key
NAME	String	Name of the facility
SHORT_NAME	String	Abbreviated name for facility
DESCRIPTION	String	A free text description or comment
EXTERNAL_FACILITY_ID	String	A text string that contains a facility identifier in the format that can be used by an external system. For example, this might contain a “Reservoir Number”, or “Pipeline Segment Number”.
FACILITY_TYPE	Integer	The foreign key to the FACILITY_TYPE table that defines valid facility types for your organization.
LAT_MIN	Float	Bounding box of the area covered by this facility
LAT_MAX	Float	
LON_MIN	Float	
LON_MAX	Float	
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

4.2 FACILITY_TYPE

The FACILITY_TYPE table defines the valid codes for the FACILITY_TYPE column of the FACILITY table. The facility type is a business definition unique to each installation of ShakeCast, but usually contains things such as “Bridge”, “Reservoir”, “Substation”, or “Pipeline”.

Column	Datatype	Description
FACILITY_TYPE	Integer	Code for the facility type
NAME	String	Facility type name
DESCRIPTION	String	Human readable meaning for this value
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

4.3 FACILITY_ATTRIBUTE

The FACILITY_ATTRIBUTE table stores arbitrary, user-defined tuples that describe a facility. These values are used when grouping facilities for purposes of defining notification requests, reports, or other actions on facilities.

Column	Datatype	Description
FACILITY_ID	Integer	Unique ID for the facility
ATTRIBUTE_NAME	String	Arbitrary attribute name string, user defined
ATTRIBUTE_VALUE	String	Arbitrary attribute value, user defined
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

4.4 FACILITY_FRAGILITY

The FACILITY_FRAGILITY table defines the facility thresholds for a facility for each fragility level and each product metric.

Column	Datatype	Description
FACILITY_FRAGILITY_ID	Integer	Auto-generated unique primary key of the FACILITY_FRAGILITY record.
FACILITY_ID	Integer	Foreign key to the FACILITY table. Contains the facility for which this FACILITY_FRAGILITY applies.
DAMAGE_LEVEL	Integer	Foreign key to the DAMAGE_LEVEL table.
METRIC	Integer	Foreign key to the METRIC table. Contains the metric for which this FACILITY_FRAGILITY applies
LOW_LIMIT	Float	Low limit of this fragility threshold at this facility for this metric and damage level.
HIGH_LIMIT	Float	High limit of this fragility threshold at this facility for this metric and damage level.
UPDATE_TIMESTAMP	Float	Last time this record was updated
UPDATE_USERNAME	String	Local username of the user who last updated this record

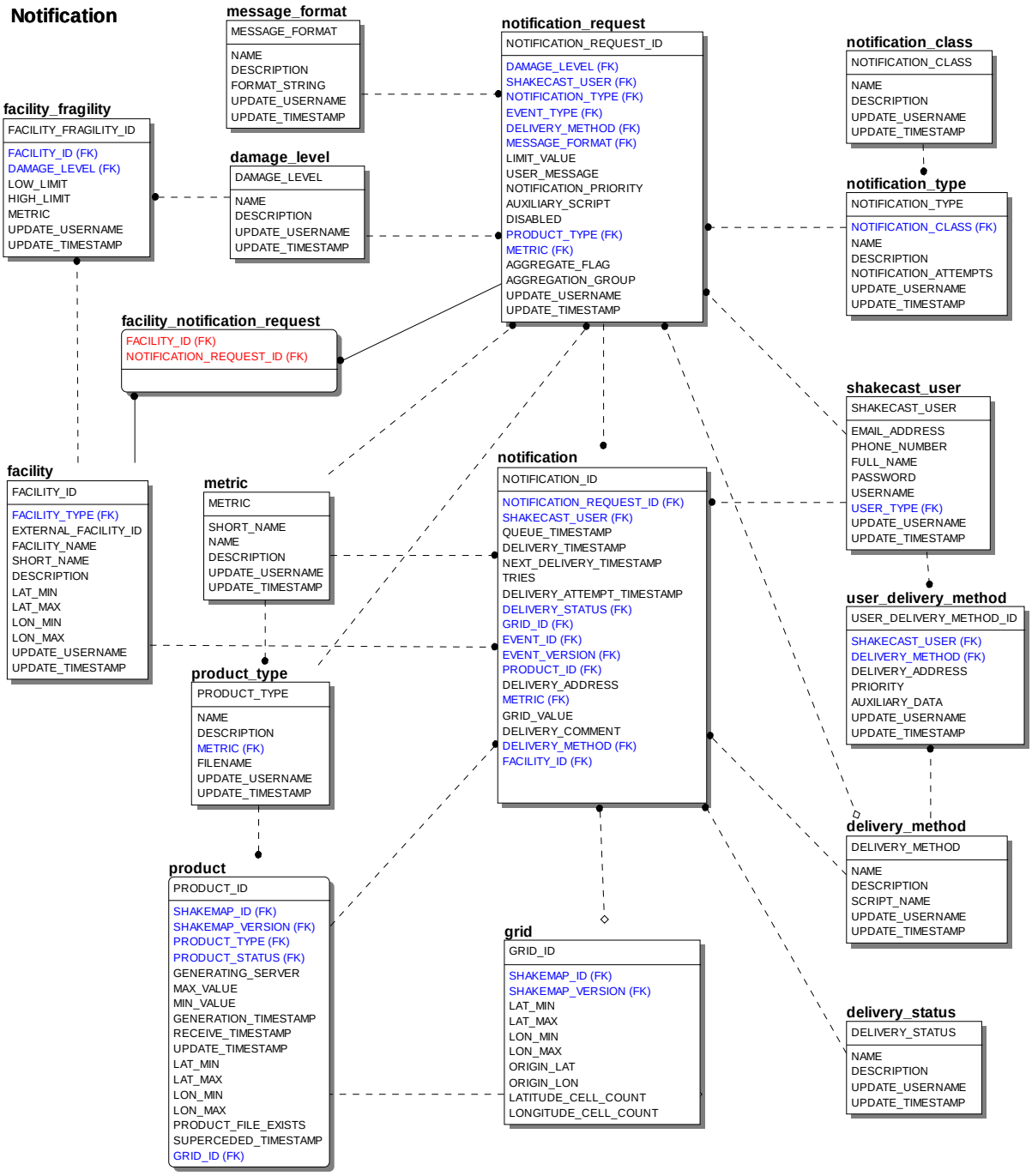
4.5 FACILITY_SHAKING

The FACILITY_SHAKING table stores the actual shaking levels associated with a specific facility and a specific ShakeMap Grid. The shaking levels are stored in the values VALUE_1 through VALUE_6, each corresponding to a different ShakeMap Metric. The column that is used for storing each Metric are defined in the SHAKEMAP_METRIC table.

Column	Datatype	Description
FACILITY_ID	Integer	Unique ID for the facility
GRID_ID	Integert	Unique ID for the ShakeMap Grid
VALUE_1	Float	Value for a particular metric from a particular ShakeMap Grid at the location of this Facility
VALUE_2	Float	Value for a particular metric from a particular ShakeMap Grid at the location of this Facility
VALUE_3	Float	Value for a particular metric from a particular ShakeMap Grid at the location of this Facility
VALUE_4	Float	Value for a particular metric from a particular ShakeMap Grid at the location of this Facility
VALUE_5	Float	Value for a particular metric from a particular ShakeMap Grid at the location of this Facility
VALUE_6	Float	Value for a particular metric from a particular ShakeMap Grid at the location of this Facility

Chapter 5 Database Tables for Notification

In addition to tables defined elsewhere, the ShakeCast system uses the following tables to compute and execute notification operations.



5.1 NOTIFICATION_REQUEST

A ShakeCast notification event is generated for each NOTIFICATION_REQUEST where the value in a grid cell exceeds the corresponding value in the request.

Column	Datatype	Description

NOTIFICATION_REQUEST_ID	Integer	Locally generated primary key
AGGREGATE_FLAG	Integer	This value is non-null if the notification is to be aggregated.
AGGREGATION_GROUP	String	When a notification is to be aggregated together with other notifications (i.e., delivered together), this value is common to all the notifications that are to be delivered together.
AUXILIARY_SCRIPT	String	Name of script to run to execute this notification request. (See the ShakeCast Template Manual for more information on the calling of auxiliary scripts.)
DAMAGE_LEVEL	Integer	Foreign key to the DAMAGE_LEVEL table. Defines the damage level used in the notification computation.
DELIVERY_METHOD	Integer	Foreign key to the DELIVERY_METHOD table. Defines how the notification is to be delivered to the user.
DISABLED	Integer	Non-null if this notification request is no longer to be honored by the notification software.
EVENT_TYPE	Integer	Foreign key to the EVENT_TYPE table. Define the type of events to which this notification request applies. For example, some notifications may apply only to “live” events, or just to scenarios, or just to test events.
LIMIT_VALUE	Float	The value of this product in this cell.
MESSAGE_FORMAT	String	Foreign key to the MESSAGE_FORMAT table. The message format defines the layout of the message, such as which data items are to be included.
METRIC	Integer	Foreign key to METRIC table. Defines the metric used in the notification computation.
NOTIFICATION_PRIORITY	Integer	Defines how this message is to be prioritized relative to other messages also to be sent to this user. (This value is not currently used.)
NOTIFICATION_TYPE	Integer	Foreign key to NOTIFICATION_TYPE table
SHAKECAST_USER	String	Foreign key to the USER table, defining which user is to be notified
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record
USER_MESSAGE	String	Arbitrary additional message the user wants sent when this notification request is executed. (This value is not currently used.)

5.2 FACILITY_NOTIFICATION_REQUEST

This table is used to join between the FACILITY table and the NOTIFICATION_REQUEST table. Rows in this table indicate which facilities are to be used in which notification requests. This allows a user to specify a single notification request that is in effect for all facilities. For example, a user might specify that they want an Email message delivered whenever all electrical substations are potentially damaged at the RED level. This can be accomplished by creating a NOTIFICATION_REQUEST and joining that request to all electrical substation facilities by placing a row in the FACILITY_NOTIFICATION_REQUEST table with that NOTIFICATION_REQUEST_ID and the FACILITY_ID of each substation.

Column	Datatype	Description
FACILITY_ID	Integer	Foreign key to the FACILITY table.
NOTIFICATION_REQUEST_ID	Integer	Foreign key to NOTIFICATION_REQUEST table

5.3 NOTIFICATION

The NOTIFICATION table contains all current and historical notification requests that have been actually triggered by the ShakeCast system. The Notification table may be thought of as the queue of notification activity (for pending notifications) or the log of activity (for historical notifications).

Column	Datatype	Description
NOTIFICATION_ID	Integer	Locally generated primary key
DELIVERY_ADDRESS	String	Actual user address (e.g., email address, pager ID, phone number, etc.) used for the message.
DELIVERY_TIMESTAMP	Datetime	The last time delivery was accomplished for this notification entry.
TRIES	Integer	The number of times delivery has been attempted for this entry
DELIVERY_METHOD	Integer	Foreign key to DELIVERY_METHOD table. Contains the method by which this notification is to be delivered. (Note that this value has been denormalized for performance, and could be derived from the NOTIFICATION_REQUEST table.)
DELIVERY_STATUS	Integer	Foreign key to DELIVERY_STATUS table. Contains last delivery status if delivery was attempted (may be success or errors), or completion or cancellation value.
DELIVERY_TIMESTAMP	Datetime	Time the queue entry was successfully delivered
EVENT_ID	Integer	Foreign key to the EVENT table. Contains the event for which this notification was triggered.
EVENT_VERSION	Integer	

GRID _ID	Integer	Foreign key to the GRID table. Contains the GRID for which this notification was triggered.
GRID_VALUE	Real	For Grid-type notifications, contains the specific value from the grid for this metric at the location of the facility, to be used in the notification message that is sent to the user.
METRIC	Integer	Foreign key to the METRIC table. Contains the metric for which this notification has been created. (Note that this value has been denormalized for performance, and could be derived from the NOTIFICATION_REQUEST table.)
NEXT_DELIVERY_TIMESTAMP	Datetime	Time the queue entry is next due to be processed
NOTIFICATION_REQUEST_ID	Integer	Foreign key to NOTIFICATION_REQUEST table
PRODUCT_ID	Integer	Foreign key to the PRODUCT table
PRODUCT_VERSION	Integer	
QUEUE_TIMESTAMP	Datetime	Time the queue entry was created.
SHAKECAST_USER	String	Foreign key to the USER table, defining which user is to be notified. (Note that this value has been denormalized for performance, and could be derived from the NOTIFICATION_REQUEST table.)

5.4 DELIVERY_STATUS

The DELIVERY_STATUS table defines the valid codes for the DELIVERY_STATUS column of the NOTIFICATION table. Valid types are locally defined.

Column	Datatype	Description
DELIVERY_STATUS	Integer	Status code
NAME	String	Status code name
DESCRIPTION	String	Description of the meaning of this status value.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.5 DAMAGE_LEVEL

The DAMAGE_LEVEL table defines the valid levels of facility damage. Valid types are typically “Green”, “Yellow”, and “Red”. Valid types are locally defined

Column	Datatype	Description
DAMAGE_LEVEL_ID	Integer	Type code for damage level, locally defined
NAME	String	Damage level name
SHORT_NAME	String	Abbreviation for damage level name
DESCRIPTION	String	Further descriptive information about the meaning of this damage level code
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.6 MESSAGE_FORMAT

The MESSGAE_FORMAT table defines the actual text and substitution directives for the message to be delivered. Messages may have varying lengths, be in various languages, or provide for substitution of various kinds of event and product data.

Column	Datatype	Description
MESSAGE_FORMAT	Integer	Type code for message format, locally defined
NAME	String	Notification type name
SHORT_NAME	String	Abbreviation for notification type name
DESCRIPTION	String	Description
FORMAT_STRING	String	A formatted string including substitution directives for event and product data.
TEMPLATE_FILE	String	Filename of a template to be used for constructing this message.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.7 NOTIFICATION_TYPE

The NOTIFICATION_TYPE table defines the valid codes for the NOTIFICATION_TYPE column of the NOTIFICATION_REQUEST table. Valid types include “SHAKING”, “DAMAGE”, “NEW_PROD”, “NEW_EVENT”, “UPD_EVENT and “CAN_EVENT”.

Column	Datatype	Description
NOTIFICATION_TYPE	String	Type code for notification requests
NAME	String	Notification type name

DESCRIPTION	String	Additional descriptive information about this notification type
NOTIFICATION_ATTEMPTS	Integer	Default value for maximum number of tries for this type of notification
NOTIFICATION_CLASS	String	Grouping value for notification types.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.8 NOTIFICATION_CLASS

The NOTIFICATION_CLASS table defines groups or classes of NOTIFICATION_TYPES. Typical classes include “EVENT”, “SYSTEM”, “FACILITY”, and “PRODUCT”.

Column	Datatype	Description
NOTIFICATION_CLASS	String	Type code for notification class
NAME	String	Notification class name
DESCRIPTION	String	Further descriptive information about the meaning of this notification class
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.9 SHAKECAST_USER

The USER table has a single record for each user who is to receive a notification.

Column	Datatype	Description
SHAKECAST_USER	String	Unique identifier for each user
FULL_NAME	String	Full name of the user
PASSWORD	String	Hashed password of this user in the ShakeCast server
USER_TYPE	Integer	Foreign key to the USER_TYPE table
EMAIL_ADDRESS	String	Primary email address for this user
PHONE_NUMBER	String	Primary phone number for this user
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.10 USER_TYPE

The USER_TYPE table defines the valid codes for the USER_TYPE column of the USER table. Valid types are locally defined.

Column	Datatype	Description
USER_TYPE	String	Type code for user types
NAME	String	User type name
DESCRIPTION	String	Further description of the user type
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

5.11 USER_DELIVERY_METHOD

This table records the delivery address and auxiliary information for the delivery methods for each user.

Column	Datatype	Description
USER_DELIVERY_METHOD	Integer	Locally-generated primary key for this USER_DELIVERY_METHOD.
SHAKECAST_USER	Integer	Foreign key to the SHAKECAST_USER table.
DELIVERY_METHOD	Integer	Foreign key to the DELIVERY_METHOD table.
DELIVERY_ADDRESS	String	The address used for this delivery method for this user.
PRIORITY	Integer	The Priority of this user delivery method over other records for the same user and delivery method. (This value is not currently used.)
AUXILIARY_DATA	String	Auxiliary data used by some delivery methods. (This value is not currently used.)
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

Chapter 6 ShakeCast Internal Operational Tables

A number of tables that define the operational configuration of the ShakeCast server. These tables are documented in the following paragraphs.

6.1 Processor Parameter

The Daemon Parameter Table stores parameters that control the behavior of the ShakeCast Processors such as the Exchange Processor, the Notification Processor, and the Message Processor.

Column	Datatype	Description
PROCESSOR_NAME	String	Name of the processor. Processors "know" their own name because it is passed to them as a parameter when they are invoked by the operating system.
PARAMETER_NAME	String	The name of the parameter for which the value is being defined.
PARAMETER_VALUE	String	The value to which the parameter is to be set. Both numeric and string values are stored as strings.
UPDATE_TIMESTAMP	Date	The date and time the record was last updated
UPDATE_USERNAME	String	The local database username of the user who last updated this record

6.2 Dispatch Task

The Dispatch Task Table is a persistent record of ShakeCast Daemon dispatch activities. This table is used to communicate task data between various processes in the ShakeCast System. The table is used in such a way that dispatch requests will survive server crashes or failures in the ShakeCast System software.

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